## Claims

1. Nonlinear precoding method based on a modulo arithmetic for the transmit-side preequalization of K user signals to be transmitted at the same time and frequency in a digital broadcast channel with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations, said user signals consisting of data symbols  $a_k$  with k from 1 to K from an  $M_k$ -level signal constellation having a signal point spacing  $A_k$  with a periodic multiple representation of the undisturbedly transmitted data symbols  $a_k$  in data symbol intervals congruent for K receive-side modulo decision devices, a transmit-power-minimizing selection of representatives  $v_k$  from the range of values  $a_k + A_k \cdot M_k \cdot z_{kk}$  where  $z_{kk}$  is from the set of integers, and linear preequalization of the selected representatives  $v_k$  to form transmit signals  $x_k$  to be transmitted,

## characterized in that

the interference symbols occurring in the broadcast channel (BC) and superimposed on the data symbols  $a_k$  and their periodic multiple representation due to cross-coupled user signals (ST<sub>k</sub>) are included in the periodic multiple representation of the data symbols  $a_k$  by means of an adapted periodic multiple representation and eliminated by the K receive-side modulo decision devices, the interference symbols between the data symbol  $a_I$  with I from 1 to K and not equal to k and the data symbol  $a_k$  being assigned periodic representatives from the range of values  $A_k \cdot M_k \cdot z_{Ik}$  with  $z_{Ik}$  from the set of integers.

2. Nonlinear precoding method according to Claim 1, characterized in that

mathematically the required transmission behavior of the broadcast channel (BC) is achieved by a factorization of the channel matrix  ${\bf H}$  describing the current transmission behavior

and known on the transmit side into a reduced channel matrix  $\mathbf{H}_{\text{red}}$  to be preequalized and a residual interference matrix  $\mathbf{R}$  according to

 $H = R H_{red}$ 

the residual interference matrix  ${\bf R}$  assuming only the value 1 on the main diagonal and all the other elements being row-wise integral multiples of the level number  $M_k$  of the signal constellation used and the reduced channel matrix  ${\bf H}_{\rm red}$  being obtained by factorization into a matrix  ${\bf F}$  with orthogonal columns, a lower triangular matrix  ${\bf B}$  and a permutation matrix  ${\bf P}$  with the introduction of a receive-side scalar gain factor g according to:

$$P^{T}H_{red}=1/g B F^{-1}$$
.

3. Nonlinear precoding method according to Claim 1 or 2, characterized in that

offset compensation  $(\boldsymbol{o})$  is already carried out on the transmit side in the transmit signals  $\boldsymbol{x}_k$  to be transmitted.